



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Databaserat analytiskt beslutsfattande **Decision Analytics**

MION46, 7,5 credits, A (Second Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED I

Date of Decision: 2023-04-20

General Information

Elective Compulsory for: MLOG1

Elective for: I4-lf, M4-lp

Language of instruction: The course will be given in English

Aim

The course aims to provide the student with thorough knowledge and understanding of concepts, quantitative methods, tools, and practices for decision making under risk, both from a theoretical and applied perspective. After the course, the students should be able to apply this knowledge to structure, analyse, and solve complex real-life decision problems. They should also be able to communicate the results, explain how the solution was obtained, motivate why this method is appropriate to use, and reflect on the strengths and weaknesses of the chosen solution method and the quality of the obtained solutions.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

For a passing grade the student must:

- describe the concepts, methods and practices for analysing decision problems under risk covered in the course and the strengths and weaknesses they possess.
- explain how these different concepts, methods and practices relate to one another and exemplify when they are appropriate to use.
- demonstrate how to use these concepts, methods and practices to structure, analyse and

solve real life decision problems.

This means that the student is required to possess sufficient knowledge and understanding to:

- articulate and discuss the challenges and impact of uncertainty and variability on the decision process and how to deal with these issues using relevant methods.
- explain the relevance of decisions, uncertainties and objectives in a decision-making process and be able to visualize resulting decision problems.
- explain how to solve and analyse decision problems using decision trees.
- explain and discuss the advantages and disadvantages of expected value analysis in a given context and extensions to risk analysis.
- explain the theoretical and practical limitations of decision trees for complex decision problems.
- explain the biases that can occur when generating subjective probabilities and the effect this can have on the decision making.
- conduct Monte Carlo-simulations and determine the number of required simulation runs.
- explain why decision makers can have different attitudes towards risk.
- demonstrate and explain how to correctly include these risk attitudes in the analysis of decision making processes.
- explain the fundamental principles of descriptive decision theory and prospect theory covered in the course, including the relation towards reference points, different risk-attitudes towards gains and losses and non-linear probability weighting functions.
- independently manage and solve project assignments with high demands on reporting/documentation of results, both in terms of oral presentations and written reports.

Competences and skills

For a passing grade the student must

For a passing grade, the student must have the skills and abilities to independently formulate, analyse, and solve complex decision problems subject to risks and uncertainties using relevant qualitative and quantitative methods. Concrete methods that the students should master are:

- Influence diagrams to visualize complex decision problems.
- Decision trees for analysing and solving decision problems under risk, and for performing sensitivity analysis.
- Monte Carlo simulation for solving complex decision problems.

Moreover, the student must demonstrate skills and abilities to correctly use established terms and concepts to clearly communicate decision problems and interpret quantitative results.

For a passing grade, the student must show the ability to solve the assignments and projects included in the course. This involves skills and abilities in framing and solving unstructured decision problems. Important aspects are problem formulation, identifying project objectives, choose appropriate methods, and performing in depth analysis. Furthermore, the student must show ability to clearly report project results, which

requires skills in oral and written presentation techniques.

Contents

The course covers contemporary concepts, qualitative and quantitative methods, tools, and practices for decision making under risk, both from theoretical and applied perspectives. Case studies and project assignments are used for introducing and explaining relevant topics, and for training the students to apply the theoretical models to structure, analyse, and solve complex decision problems.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: Take home exams/assignments. The examination is designed to assess the student's ability to independently solve loosely structured decision problems, typically found in practice. Important assessment criteria are to clearly communicate the results and explain how the problems are solved, both orally, in well-structured presentations, and in writing by producing well-structured technical reports.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Admission

Admission requirements:

- Mathematical Statistics, Basic Course, (FMSF20, FMSF50, FMSF70 or FMSF80), or equivalent

Assumed prior knowledge: MIOA12, MIOA15 or MIOA01 Managerial Economics Basic Course, MIOF25 Managerial Economics Advanced Course, MIOF10 Production and Inventory Control, MIOF30 Operations Research Basic Course, or equivalent.

The number of participants is limited to: No

Reading list

- Chelst, K. & Canbolat, Y.B. : Value-added decision making for managers. Taylor & Francis Group, 2012.
- Albright, S.C. & Winston, W.L. : Business Analytics: Data Analysis and Decision Making, 5th edition. Cengage Learning, 2015.
- Related scientific research papers will be announced throughout the course.

Contact and other information

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Course homepage: <http://www.pm.lth.se>